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10/024,611	10/29/2001	Junya Shimizu	JP920000339JP1/954-010483	4135

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EXAMINER

HUNG, YUBIN

ART UNIT

PAPER NUMBER

2625

DATE MAILED: 09/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/024,611

Applicant(s)

SHIMIZU, JUNYA

Examiner

Yubin Hung

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10/29/01 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 10/29/01, 8/6/04
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to because Figs. 8-10 cannot be clearly reproduced. . Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

2. The abstract of the disclosure is objected to because it contains two paragraphs. Correction is required. See MPEP § 608.01(b). (Note: this objection can be overcome by deleting the paragraph containing the title.)

***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 4 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Regarding claim 4, the limitation recited in lines 8-10 that is ambiguous and indefinite because it does not describe from what the average is subtracted from. **(For examination purpose it will be assumed that the average is subtracted from each observed signal.)**

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-3, 5-6, 8-9, 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cardoso et al. ("Equivalent Adaptive Source Separation," IEEE Trans. Signal Processing, Vol. 44, No. 12, December 1996, pp. 3017-3030) and Hassibi

et al. ("H-Infinity Optimality of the LMS Algorithm," IEEE Trans. Signal Processing, Vol. 44, No. 2, February 1996, pp. 267-280).

8. Regarding claim 1, and similarly claims 5 and 14, Cardoso discloses

- selecting a specific separation matrix by optimizing a cost function for said observed data  
[P. 3017: Fig. 1 (note that  $B_i$  is a separation matrix and  $x_i$  is the mixed signal; P. 3019, left column, lines 7-13 teaches minimizing a cost function to obtain the separation matrix)]
- multiplying the observed data by the selected separation matrix to restore the original multidimensional signals  
[P. 3017, Fig. 1 and Eq. (2)]

Cardoso does not expressly disclose that the cost function to be optimized is of either the H-infinity norm type or the MinMax strategy type.

However, in P. 270, right column, the paragraph beginning with "The above problem formulation..." Hassibi teaches that H-infinity optimal estimators guarantee the smallest estimation error and therefore motivates one of ordinary skill in the art to use a H-infinity norm type cost function in the estimation of the separation matrix.

Cardoso and Hassibi are combinable because they both have aspects that are from the same field of endeavor of optimization.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify Cardoso with the teachings of Hassibi by using a H-infinity norm type cost

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function in the estimation of the separation matrix. The motivation would have been because H-infinity optimal estimators guarantee the smallest estimation error.

Therefore, it would have been obvious to combine Hassibi with Cardoso to obtain the invention of claim 1.

9. Regarding claim 2, and similarly claims 6, 8 and 12-13, Cardoso further teaches

- introducing a cost function for the observed data, the cost function being based on a function that has a monotonously increasing characteristic  
[P. 3019, left column, Eq. 6. Note that  $f(y)$ , and therefore  $\Phi(B)$ , is monotonously increasing]
- estimating separation matrix using an adaptive filter that optimizes the introduced cost function  
[Abstract. Note that the source separation approach described in Cardoso is adaptive in nature]

Note that regarding claim 12, it is clear that the apparatus specified in claim 8 can process the medical image data of claim 12 since such image data are mixtures of multiple signals (information signals and interference signals) and therefore are the kind of input data for the apparatus of claim 8.

10. Regarding claim 3, and similarly claim 9, Cardoso further teaches/suggests minimizing a monotonously cost function in terms of the separation matrix [P. 3019, left column,  $\Phi(B)$  of Eq. 6]. In addition, in [P. 267, the 2<sup>nd</sup> paragraph from the bottom of the right column] Hassibi discloses the use of an exponential cost function.

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11. Claims 7 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cardoso et al. ("Equivalent Adaptive Source Separation," IEEE Trans. Signal Processing, Vol. 44, No. 12, December 1996, pp. 3017-3030) and Hassibi et al. ("H-Infinity Optimality of the LMS Algorithm," IEEE Trans. Signal Processing, Vol. 44, No. 2, February 1996, pp. 267-280) as applied to claims 1-3, 5-6, 8-9, 12-14, and further in view of Talluri et al. (US 6,026,183).

12. Regarding claim 7, the combined invention of Cardoso and Hassibi teaches/suggests all limitations of its parent, claim 6.

The combined invention of Cardoso and Hassibi does not expressly teach/suggest

- wherein the observed data input by the input means comprises given image data that consist of mixtures of moving picture data that are considered as three-dimensional data

However, in [Fig. 2; Col. 4, line 59 – Col. 5, line 7] Talluri teaches processing observed data (video sequence) comprising frames of images, each of which consists of a mixture of moving objects and a stationary background; the moving objects are separated from the mixture for encoding. (Note that the volume of video sequence is considered a 3-D data.)

The combined invention of Cardoso and Hassibi is combinable with Talluri because they have aspects that are from the same field of endeavor of signal separation.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Cardoso and Hassibi with the teachings of Talluri by using data input consisting of mixtures of moving pictures. The motivation would have been to apply signal separation technique to applications such as surveillance in which moving objects can be extracted from a stationary background so that only the extracted objects need to be compressed and thus reduces storage requirement as well as transmission cost. [See Col. 5, lines 4-16 of Talluri.]

Therefore, it would have been obvious to combine Talluri with Hassibi and Cardoso to obtain the invention of claim 7.

13. Regarding claim 11, the combined invention of Cardoso and Hassibi teaches/suggests all limitations of its parent, claim 8. In addition, Talluri further discloses applications that separate faces from a mixture of signals. [See Fig. 4 and Col. 12, lines 44-53.]

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14. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cardoso et al. ("Equivalent Adaptive Source Separation," IEEE Trans. Signal Processing, Vol. 44, No. 12, December 1996, pp. 3017-3030) and Hassibi et al. ("H-Infinity Optimality of the LMS Algorithm," IEEE Trans. Signal Processing, Vol. 44, No. 2, February 1996, pp.



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267-280) as applied to claims 1-3, 5-6, 8-9, 12-14, and further in view of Aghihotri et al. (US 6,614,930).

Regarding claim 10, the combined invention of Cardoso and Hassibi teaches/suggests all limitations of its parent, claim 8.

The combined invention of Cardoso and Hassibi does not expressly teach/suggest

- wherein the image data comprises text overwritten background image and observed as multiple frames

However, in [Figs. 3A, 3B; Col. 6, line 66 – Col. 7, line 24] Aghihotri teaches processing image data comprising text overwritten background image and observed as multiple frames. (Note that lines 1-5 of column 7 indicate that the overwriting text is observed over multiple frames.)

The combined invention of Cardoso and Hassibi is combinable with Aghihotri because they have aspects that are from the same field of endeavor of signal separation.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Cardoso and Hassibi with the teachings of Aghihotri by using image data comprising text overwritten background image and observed as multiple frames. The motivation would have been to apply signal separation technique to separate text from background image so that the text can be recognized using, say

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OCR techniques, in order to provide information contributing to scene analysis. Multiple frames can be averaged to obtain better-quality text images. [See Col. 7, lines 1-5 of Aghihotri.]

Therefore, it would have been obvious to combine Aghihotri with Hassibi and Cardoso to obtain the invention of claim 10.

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15. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hirsch (US 5,261,007) and Graupe (US 5,721,694), in view of Cardoso et al. ("Equivalent Adaptive Source Separation," IEEE Trans. Signal Processing, Vol. 44, No. 12, December 1996, pp. 3017-3030) and Hassibi et al. ("H-Infinity Optimality of the LMS Algorithm," IEEE Trans. Signal Processing, Vol. 44, No. 2, February 1996, pp. 267-280).

Regarding claim 4, Hirsch discloses

- reading the observed signals  
[Fig. 2, "Sound Signal Input"]
- transforming a data structure in terms of the read observed signals  
[Fig. 2, numerals 12a, 14a; Col. 4, lines 47-55]
- subtracting an average of the observed signals which data structure has been transformed to perform zero-averaging  
[Fig. 2, numerals 30, 32; Col. 4, lines 61-64]
- performing separation processing on the (zero-averaged) observed signals  
[Fig. 2, numerals 34-40; Col. 4, line 64 -Col. 5, line 8]

Hirsch neither expressly teaches/suggests performing whitening on the observed signals that have undergone averaging before performing separation processing and performing inverse whitening as post-processing on observed signals that have undergone separation processing, nor that the separation is based on a monotonously increasing cost function.

However, in numeral 50 of Fig. 1A and numeral 241 of Fig. 1B Graupe teaches/suggests the use of whitening and inverse whitening in filtering inputs containing a mixture of both information signal and a noise signal. [See also, Col. 14, lines 10-33 of Hirsch.] In addition, per the analysis of claim 2, the combined invention of Cardoso and Hassibi teaches/suggests signal separation basing on optimizing a monotonously increasing cost function.

Hirsch, Graupe and the combined invention of Cardoso and Hassibi are combinable because they have aspects that are from the same field of endeavor of signal separation.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the Hirsch with the teachings of Graupe and combined invention of Cardoso and Hassibi by whitening and inverse whitening inputs containing a mixture of signals and separating such signals basing on optimizing a monotonously increasing cost function. The motivation would have been to (use whitening to) render the noise of the noisy input signal into a substantially white noise signal and inverse whitening to provide

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a substantially noise free output. [See the abstract of Graupe.] On the other hand, using an exponential cost function (which is monotonically increasing) because then the commonly used least-mean squares (LMS) algorithm for optimization is risk-sensitive optimal. [See Hassibi: P. 267, right column, the 2nd paragraph from bottom.]

Therefore, it would have been obvious to combine Graupe, Hassibi and Cardoso with Hirsch to obtain the invention of claim 4.

#### ***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yubin Hung whose telephone number is (703) 305-1896. The examiner can normally be reached on 7:30 - 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (703) 308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Yubin Hung  
Patent Examiner  
September 28, 2004

A handwritten signature in black ink, appearing to read 'Bhavesh M. Mehta', with a stylized, cursive script.

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